

U. S. Bureau of Reclamation

***Great Plains Region
Water Conservation Field
Services Program***

***- Part II -
FY2003 Program Activity
Highlights***

Background -

'The Mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.'

The Reclamation Program was created by the Reclamation Act of 1902 to reclaim the arid West and to provide economic stability in the 17 western states by developing irrigation projects. Over time, these single purpose projects gave way to the development and construction of multipurpose water resource projects with increasingly greater emphasis placed on the efficient use of developed water supplies, the protection of societal and environmental values, and the protection of the Federal investment and its infrastructure.

In 1996, Reclamation initiated the Water Conservation Field Service Program (WCFSP) to encourage water conservation and efficient use of water supplies on Federal Reclamation projects, as well as foster improved water management on a watershed basis throughout the western states.

The purpose of the WCFSP is to actively encourage water conservation, assist irrigation and other water districts in developing and implementing water conservation plans, and

complement and support other state and local conservation efforts. In addition, it helps Reclamation fulfill other obligations under other Federal directives, i.e., Fish and Wildlife Coordination Act of 1958 and the Endangered Species Act of 1973. It provides Reclamation the opportunity to broaden partnerships with other Federal and non-Federal agencies in fostering improved watershed management.

While the program emphasis under the Reclamation Reform Act of 1982 (RRA) is to work with Reclamation projects, the WCFSP is also designed to contribute to watershed management partnerships outside of Reclamation projects in order to improve fish and wildlife habitat associated with water systems or water supplies affected by Reclamation projects.

The Great Plains Region administers Reclamation projects in Montana, North and South Dakota, Colorado, Wyoming, Nebraska, Kansas, Oklahoma and Texas and has a great diversity of irrigation and non-irrigation related constituents. In addition to irrigation districts, Area Office WCFSP Coordinators work with tribal entities, rural water systems, non-profit organizations and municipalities on water management and conservation issues.

Area, Regional, and Denver offices provide technical and financial assistance in the four emphasis areas of the WCFSP:

- Conservation planning
- Conservation education
- Demonstration of innovative conservation technologies
- Implementation of conservation measures.

Following is a summarization of selected activities undertaken by program partners and Reclamation in FY 2003. The activities are organized by the four program emphasis areas.

— Conservation Planning —

DKAO - Conservation Plan Development -

- DKAO encouraged water districts to develop and implement water conservation and

management plans. Technical assistance and guidance was offered to all interested water users in preparing conservation plans. Seven conservation plans from irrigation entities and six from municipal and rural water entities have been received and commented on by DKAO. Of the ten irrigation entities in the Dakotas receiving Reclamation water, only three are required to submit plans under RRA.

DKAO - Rural Water Systems -

- DKAO is involved in the planning, design, construction, operations and maintenance of numerous rural water systems in North Dakota and South Dakota. Project sponsors of these systems are required or encouraged to develop a water conservation plan. DKAO staff will review these plans and discuss potential modifications.



Installing water line on the Mni Wiconi Rural Water System, SD

DKAO worked with the South Dakota Association of Rural Water Systems and North Dakota Rural Water Systems Association to provide training, technical assistance, and develop educational programs for the rural water distribution systems.

DKAO – Belle Fourche Irrigation District and Angostura Irrigation District Assessments of Potential Automation Opportunities

- DKAO utilized Reclamation staff from the Denver Technical Service Center (TSC) to assess the projects' conveyance system for automation potential. TSC worked with the

Districts to prioritize their automation needs and to develop an implementation plan.

DKAO – Belle Fourche Watershed Assessment -

- DKAO collaborated with the local conservation district, Belle Fourche Irrigation District, and South Dakota Department of Environment and Natural Resources to conduct a watershed assessment. The goal is to assess the condition of the watershed and identify major contributors. Following the assessment, a plan will be developed with the partners to identify improvements, seek funding and implement beneficial activities.

DKAO – Area Irrigation Specialist, North Dakota State University (NDSU) Extension Service-

- DKAO participates in a Bridging-The-Headgate cooperative agreement with NDSU, and the Garrison Diversion Conservancy District to cost-share an Extension Irrigation Specialist. The objective of the agreement is to provide local, federal and state coordination and collaboration on planning, educational, and demonstration activities related to irrigation development and water conservation within the Garrison Diversion Project. NDSU has significant irrigation expertise and all parties have a vested interest in efficiently utilizing water resources in the state. .

ECAO - Arkansas Valley Salinity Study - Colorado State University (CSU) -

- This cost-sharing project educates irrigators and water managers in

the Arkansas Valley about salinity and water logging problems and their solutions through field days and workshops. Project findings will be disseminated through appropriate venues and the interaction and



feedback of decision-makers will be sought. Efforts will be made to gain direct input in the development of alternative solutions for consideration in CSU model development.

ECAO - South Platte Basin Salinity Study – Northern Colorado Water Conservancy District (NCWCD) -

- This project entails a six-year data collection effort of salinity within NCWCD boundaries. NCWCD's Irrigation Management Service group will be collecting water and soil samples. They will also be using the dual EM-38 to determine levels of salinity within fields. Project findings will be disseminated through appropriate venues and the interaction and feedback of decision-makers will be sought.

MTAO - Canal Efficiency Study -

- Through a cooperative agreement, MTAO provided technical and financial assistance to finish a study that will be used to develop a



Hydraulic technicians conduct a discharge measurement as part of the Milk River Canal Efficiency Study

water budget and determine canal efficiencies of the 120,000 acre Milk River Project. The study will identify problem areas and provide the Project with potential solutions.

MTAO – Muddy Creek Watershed Assessment –

- MTAO worked with local watershed group, Greenfields Irrigation District, and Montana State University Extension Service to continue a watershed assessment of Muddy Creek. The goal is to identify major contributors to the flow in Muddy Creek with the long term goal to identify potential reductions to the flow.

MTAO - Canal Conveyance Automation Potential Assessment -

- MTAO provided funding to the Paradise Valley Irrigation District to hire a contractor to assess their conveyance system for automation potential. The Contractor prioritized their automation needs and developed an implementation plan.

MTAO – Canal Efficiency Study –

- Through a cooperative agreement, MTAO provided technical and financial assistance to finish a study that will be used to develop a water budget and determine canal efficiencies of the Huntley Project Irrigation District. The Study will identify problem areas and provide the District with potential activities to include in their water conservation plan.

MTAO – Water Conservation Plans -

- Through a cooperative agreement, the Montana Department of Natural Resources and Conservation assists the irrigation districts in the Milk River Basin develop, implement, and update quality water conservation plans.

NKAO - Conservation Plan Development -

- NKAO's priority was to work with irrigation districts to update water conservation plans. NKAO continues to provide assistance in reviewing and updating water conservation plans for 12 Reclamation Irrigation Districts. NKAO has also provided planning assistance to private irrigation districts.

NKAO - Water Supply Contract Renewals – Republican River Basin – Solomon River Basin -

- Water conservation commitments were made by irrigation districts in the Republican and Solomon River basins in order to receive 40 year contracts. NKAO has provided technical and financial assistance to these districts in order to meet system and on-farm efficiency goals set by these commitments. NKAO and these Districts hold annual operations meetings to discuss current year operations, historic operations, completed and planned conservation measures, and future water supplies and system improvements.

WYAO - State Water Conservationist Position - Wyoming Water Development Commission -

- This is the seventh year of a cooperative effort between the State of Wyoming and Reclamation to improve water management and conservation within the state. Wyoming has an interest in the success of the WCFSP, and the Wyoming Water Development Commission (WWDC) has significant expertise in the area of water management improvements, evaluations, etc. This effort will reduce duplication of efforts and provide for a larger technical resource pool to draw from. Also, it is anticipated WWDC will be capable of working most efficiently with water users in providing assistance in developing and implementing water conservation plans.

OTAO – Water Conservation Planning -

- In the OTAO, a total of 13 water conservation plans are required to be submitted under RRA from entities receiving Reclamation water. These contractors include 8 water wholesalers, 3 municipalities, and 2 irrigation districts. The OTAO, through the WCFSP, provides technical and financial assistance to develop water conservation plans for these contractors.

OTAO – Municipal Water Conservation Planning -

- In 2003, the Fort Cobb Master Conservancy District was assisted in finalizing a revision to their Water Conservation Plan. In addition, the City of Wichita, the City of Corpus Christi, and Canadian River Municipal Water Authority were provided technical assistance by Area office staff in planning based on EPA's Guidelines for Municipal Conservation Plans. The comprehensive revisions will result in conservation measures identified for implementation over the next 5 years.

OTAO – Agricultural Water Conservation Planning -

- Tom Green Water Conservation and Improvement District #1 was provided technical assistance from Area office staff in

updating the District's Water Conservation Plan to identify new conservation measures planned for implementation. Tom Green was also selected as recipient of the Great Plains Region's 2003 Commissioner's Award for Water Conservation. The District has improved their irrigation efficiency 30%, from 61% in 1997 to currently over 90%.



Tom Green WCID #1 staff and board members

OTAO – American Water Works Association (AWWA) Water Conservation Planning Workshop

- Financial assistance was provided the City of San Angelo, Arbuckle Master Conservancy District, Fort Cobb Master Conservancy District, Central Oklahoma Master Conservancy District, and Foss Reservoir Master Conservancy District to attend the AWWA Water Conservation Planning Workshop in February of 2003.

OTAO – Flow Measurement Report -

- Area Office and Denver Service Center staff worked together to prepare a technical report to



Installation of ultra-sonic flow meters at Central Oklahoma MCD

- assist Central Oklahoma Master Conservancy District management and Board of Directors evaluate flow measurement options for the distribution system of the District. The District is currently installing flow measurement equipment at 5 locations on the distribution system based on recommendations identified in the report.

— Conservation Education —

DKAO – Irrigation District Training and Education Opportunities -

- Financial assistance was provided to water entities to participate in education and training activities related to water management and water operations. Approximately 25 staff from South Dakota irrigation districts received training conducted by Reclamation. DKAO has agreements with North Dakota State University (NDSU) and South Dakota State University (SDSU) to provide educational information and activities to Reclamation water users. The activities included workshops and field-days as forums to discuss irrigation management, irrigation scheduling, estimating crop water use, and improving irrigation efficiencies.
- DKAO participates in Children's Water Festivals in North Dakota and South Dakota as an opportunity to educate elementary grade students in all facets of water.



Teaching about Reclamation dams, water conservation, and letting kids build a dam

DKAO – Water Education Festivals & Displays -

- DKAO sponsors and participates in annual water conventions in North Dakota and South Dakota in cooperation the South Dakota Association of Rural Water Systems and North Dakota Rural Water Systems Association (NDRWSA).



Bismarck, ND, - Annual NDRWSA Convention

DKAO – Crop Water Use and Irrigation Scheduling Information -

- SDSU installed and renovated weather stations in Reclamation Irrigation Districts with funding provided by DKAO. The weather stations are used to develop and disseminate crop water use information for Reclamation projects in South Dakota. The Districts plan to develop internet web sites to provide soils, water, cropping information, and maps to producers.

ECAO - Rain gauges in Northern Colorado - Colorado Climate Control -

- This program gives the community in Northern Colorado an opportunity to learn more about their local weather. This is accomplished by providing participants with ECAO sponsored rain gauges. They report to the Colorado Climate Control Center in Fort Collins, any precipitation that occurs throughout the year.

ECAO - Water Festivals – Northern and Southeastern Colorado Water Conservancy Districts and Local Municipalities -

- A Children's Water Festival is an opportunity to educate 4th and 5th grade students in all facets of water. Reclamation has helped to financially sponsor about 7,000 students along

the Front Slope of Colorado.



Water festival activity at Boulder, CO

ECAO - WCFSP Resource Center -

- The center has water management information, videos, posters, books, publication, and water conservation tokens and prizes, and all is available to the public.



Display of tokens with Otto Otter

ECAO - Discovery Center Science Museum Water Exhibit - Fort Collins Water Utilities -

- Through a cooperative agreement, a display of the water cycle was developed and installed in northern Colorado. A control panel with questions and answers is associated with the display to further enhance knowledge of the water cycle.

MTAO - Milk River Watershed News -

- In cooperation with the Montana Department of Natural Resources and Conservation, MTAO sponsors a quarterly newsletter that is mailed to irrigators in the Milk River

Project, along with local, state, and Federal officials, sportsman's groups, and other local citizens. The newsletter is designed to provide timely information to basin residents on issues that have the potential to impact them.

MTAO – Water Use Efficiency Education -

- MTAO partnered with Montana State University Extension Service to provide water use efficiency education through newsletters, workshops, and field visits. The education is tied to areas that participate in Reclamation's AgriMet network.

MTAO – Water Conservation Education –

- Funding provided to Montana Watercourse was used to conduct water education workshops and provide water education publications to educators, students, water-oriented local organizations, and active landowners and citizens.

MTAO – Milk River Educator's Guide -

- To promote education and outreach in the basin, a Milk River video guidebook, and an educators guidebook was published to compliment the video of the Milk River. Reclamation provided funds through a grant agreement with Hill County Conservation District.

NKAO – Technical Workshop – Agricultural Water Management and Systems Modernization –

- Through the Bridging-the-Headgate Program, NKAO assisted in hosting an Agricultural Water Management and Systems Modernization Technical Workshop held on April 8, 2003 in Gering, Nebraska. The workshop covered technologies for stretching water supplies, system modernization developments, flow measurement, available assistance programs, and local case studies.

NKAO - Children's Groundwater Festival -

- NKAO is a major sponsor of the Children's Groundwater Festival, which is held annually in Grand Island, NE. 2003 was the 15th year of the festival, which has been used as a model for other states and countries to develop other festivals. Over 3,000 grade school children attended the festival to learn about

groundwater and associated water resources. Reclamation provided funding assistance through the Groundwater Foundation and hosted a presentation at the festival.



Grand Island fifth grader Nicole Greenwalt and Nebraska Governor Mike Johanns assist Reclamation's Jeff Peterson at the 2003 Children's Groundwater Festival. Jeff incorporates magic tricks while teaching students the importance of water conservation

NKAO - Project WET (Water Education for Teachers) -

- Project WET is an interdisciplinary water education program to advise and promote the awareness, appreciation, knowledge, and stewardship of water resources. Recently Project WET has expanded to supply education seminars to upper level college students who will soon be entering the educational field. NKAO provided assistance to the Nebraska 4-H Development Foundation for support of Project WET, along with the University of Nebraska Cooperative Extension, the Nebraska Forest Service, and the Nebraska Game & Parks Commission.

NKAO-OTAO – Great Plains Foundation -

- NKAO combined with OTAO in providing funding assistance to The Great Plains Foundation for assisting with the Foundation's annual water symposium. The 2003 Festival titled "Water Resources in the Lives of People of the Great Plains Past, Present, and Future" was held March 26-28, 2003 at the Wichita State University Hughes Metropolitan Complex in Wichita, Kansas.

NKAO – Pipe Measurement Video -

- NKAO and the Water Resources Research

Lab worked with the NRCS and the University of Nebraska Extension Service to produce an instructional video titled "Irrigation Flow Measurement in Pipe Systems". This video provides information on the importance of water measurement and the selection, installation, and operation and maintenance of water measurement devices in piped systems.

NKAO – Flowmeter Testing and Field Operator Training Facility -

- The NKAO provided technical and funding assistance through agreement with the Kansas Division of Water Resources (KDWR) for the installation of a Flowmeter Testing and Field Operator Training Facility at the University of Kansas (KU). This facility will provide the KDWR and KU with a traceable, defensible, flow measurement standard, which the KDWR can use to facilitate the compliance monitoring of groundwater usage throughout the state of Kansas. Reclamation's Water Resources Research Laboratory provided technical assistance for the design of the facility, and the installation was completed in 2003.

NKAO – Mid-High Plains Education Initiative -

- NKAO provides assistance to the Groundwater Foundation for the Mid-High Plains Education Initiative. This project's initial target was to continue water resource discussions between all interests involved in the contract renewal process, with the first area of focus being the Republican River Basin. Participating groups include irrigation districts, natural resource districts, groundwater guardian groups, public power agencies, university educators, private irrigators, and other local, state, and federal agencies. The goal of the project is to form a local group that will take over the leadership of this education project by 2005.

WYAO - Children's Water Festival - Wyoming Children's Water Festival Foundation -

- A cooperative agreement between Reclamation and the Wyoming Children's Water Festival Foundation provided funds to assist in the 2003 Wyoming State Children's Water Festival. The Festival provided a unique opportunity to inform large numbers of school children distributed over a large geographic

area, of the importance of protecting water resources, responsible water use, and proactive pollution prevention. This year's festival attracted over 1,500 4th and 5th grade students from all over the state. Students were able to participate in a simple hands-on demonstration of how reservoir storage water is delivered to various water users. The demonstration illustrated the basic concepts associated with reservoir storage, water rights, and water delivery.



Reclamation's Jay Dallman demonstrates reservoir storage deliveries at the Children's Water Festival

WYAO - Water Education Calendar - Utah State University, International Office for Water Education -

- WYAO was part sponsor in the purchase of water education calendars. The calendars contain water-related artwork created by elementary students, and include questions and facts about water. The calendars assist teachers and students in gaining a better understanding of the role water plays in our lives and how we can help deal with future problems.

WYAO – Using the Landscape as a Classroom, Introduction to Rangeland Perspectives - Wyoming Agriculture in the Classroom -

- Reclamation provided funding to Wyoming Agriculture in the classroom. Wyoming Agriculture in the Classroom is working to increase K-12 teachers and students knowledge of the benefit, function, and management of watersheds and riparian zones through a consensus-based decision-making workshop for educators.



Wyoming Agriculture in the Classroom activity

WYAO – Irrigation Conservation Workshops for North Platte Valley Water Users - University of Nebraska - Panhandle Extension and Research Center -

- Reclamation provided funding to the University of Nebraska to host workshops and operational meetings to highlight new and existing water conservation technologies to assist North Platte Valley water users with making informed water resource management decisions.

OTAO – Irrigation District Field Tour -

- Reclamation arranged for staff from Lugert-Altus Irrigation District to tour the facilities of Tom Green WCID#1. Following the tour, Lugert-Altus worked with Reclamation to pursue implementation of similar modernization efforts.



Tom Green WCID #1 district tour

OTAO - Update Telemetry System to Facilitate Water Reuse –

- This project was a cooperative effort between Reclamation, the City of San Angelo (City), and Tom Green WCID#1. Funding was provided to the City on a 50% cost-share basis and was utilized to modernize the District and City's SCADA system.



Automated check structure

OTAO – Learning-to-be-Waterwise -

- Funding was provided on a 50% cost-share basis to the City of Corpus Christi, and Foss Reservoir Master Conservancy District to encourage these municipal water suppliers to fund water conservation education as part of implementation of their water conservation plans. For a number of years these cities have supported the “Learning to be Waterwise” program, developed for grades 4-8 by the nonprofit National Energy Foundation. The Learning to be Waterwise program is a “learn-by-doing” program that teaches 4th–8th graders and their parents about the water cycle and explores sources, uses and conservation of water. Students work with their parents to learn about their own home water use, while installing technologies from their resource action kits to save water, energy, and money on utility bills.

OTAO - Earth Awareness Researchers for Tomorrows Habitat (EARTH) –

- With support in part from Reclamation and the City of Wichita, Kansas, EARTH served an estimated 1,800 students taught by 17 teachers in six schools during the 2003 school year. The end of the year workshop was attended by over 1,200 students, 80 presenters, and 130 high school students. The EARTH program is a unique

educational approach, which promotes education for local Wichita, KS youth as a way of protecting the watershed and the groundwater.



Stream table display at EARTH Workshop, Wichita KS

OTAO - Workshop - Agricultural Water Management and Systems Modernization

- The OTAO made available financial assistance to attend irrigation district modernization training conducted by the Irrigation Technology Research Center in April of 2003 in Gering, Nebraska



Stu Styles, Irrigation Technology Research Center

— Conservation Technology Demonstration —

MTAO – Canal Sealant Polymer Application –

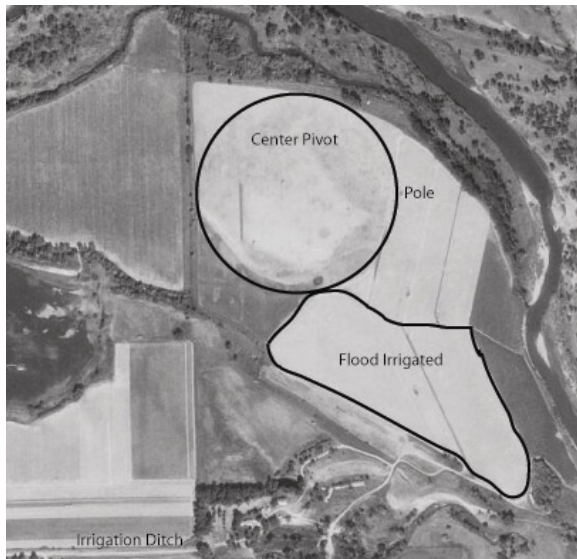
- Financial Assistance was provided to Greenfields Irrigation District and Fort Belknap Irrigation District for the demonstration of using a polymer for a canal sealant.

MTAO – Sontek Rivercat –

- MTAO purchased portable water measurement equipment developed by Sontek. The equipment was used to demonstrate an alternative to a wading discharge measurement.

Dkao – Mini-pivot Demonstration -

- Mini center pivot systems were designed and installed on the Angostura and Belle Fourche Irrigation Districts on previously flood irrigated fields that have soils types that were difficult to flood irrigate; and topography limiting flood irrigation efficiency. The Belle Fourche site indicated substantial water savings, with the mini pivot applying 75 percent less water than the adjacent flood irrigation system. Considerable interest in this technology has been generated in the two project areas as evident by over 150 participants at one Irrigation Field Day and new center pivot irrigation systems being sold in the area for the first time in many years. This demonstration showed people the ability of center pivots to increase production and decrease labor in a cost effective manner.



Aerial map of Belle Fourche project site

Dkao – Demonstration Activities -

- Dkao has agreements with SDSU and NDSU to demonstrate and evaluate innovative conservation technologies to water users. Surge valves, mini-center

pivots, and alternative crops with lower water requirements are some of the technologies being demonstrated in South Dakota. NDSU designed and constructed one floating and one submerged low water pump intake structure and are demonstrating them on the Heart River. NDSU has also adapted an irrigation scheduling program for handheld computers (Palm format) and demonstrated it to farmers and installed a variable speed pump controller at the NDSU Research Extension Center in Carrington to demonstrate the technology to irrigators.



Floating low water intake designed, constructed and demonstrated by NDSU for the Heart River Irrigators (note worn pump bowl from pumping sand with previous intake)

Dkao - Canal Sealant and Seepage Reduction Demonstration Project –

- A cooperative agreement for conservation demonstration and implementation with Buford-Trenton Irrigation District has allowed



Custom built, large volume sprayer built to apply canal sealant. Boom extends across entire canal

the demonstration of a spray-on canal sealant to reduce canal seepage. Irrigation districts cannot afford the expense of lining large canals, or replacing canals with pipelines, without substantial financial assistance. The use of a spray-on canal sealant to reduce canal seepage may be a cost effective alternative for districts to consider.

DKAO - Xeriscape Landscape Demonstration – Fargo, ND -

- DKAO has a cooperative agreement with the City of Fargo, ND to conduct a landscape water conservation demonstration. Data is being compiled and analyzed comparing conventional lawn water use to Xeriscape landscapes.



Home of a Fargo Xeriscape study participant

DKAO - Xeriscape Gardens -

- Xeriscape demonstration and educational gardens are being developed in cooperation with the cities of Fargo, ND and Rapid City,



Rapid City Xeriscape education and demonstration garden

SD. The gardens will educate local landowners about the type of plants and

landscape materials available to incorporate in their own lawns. A variety of local entities contributed time and funds to the garden. The Fargo Xeriscape education and demonstration garden has been constructed.

ECAO - Xeriscape Demonstration - Metro Water Conservation, Inc -

- In cooperation with Reclamation's Washington and Denver Offices, continued participation in one of five Water Conservation Challenge Grants. This six year cost-sharing agreement with the MWCI is to conduct a landscape water conservation demonstration. Data will be collected, compiled, and formatted for use in a broader framed analysis. Participants include the cities of: Fort Collins, Boulder, Colorado Springs, Arvada and Denver. Study will end in 2004.

ECAO - Xeriscape Garden – Southeastern Colorado Water Conservancy District (SECWCD)

- The xeriscape garden is the first of its kind in the Pueblo area. This garden educates local users about the type of plants and hardscape to incorporate in their own lawns. The garden is located at the SECWCD headquarters. A variety of local entities contributed time and funds to the garden.

ECAO - Evapotranspiration rates for Xeriscape plants – Northern Colorado Water Conservancy District -

- This project monitors the growth and water usage of 45 typical landscape plants (15 species with three replications of each). Weekly measurements are taken of the amount of water used, with daily observation of two species at a time, rotated throughout the growing season to obtain daily data. The plants are established in drainage lysimeters and the measured area covered by the plants is related to an equivalent coverage area of turfgrass. Based on the size of the plant, estimates of the amount of water being used are compared to turfgrass. The project is to be completed after the 2003-growing season.

NKAO – Limited Irrigation Management Strategies – UNL Extension Service

- Reclamation continues to provide financial

assistance to the University of Nebraska for a Limited Irrigation Management Strategies study in the Republican River Basin. The project demonstrates implications of alternative irrigation management strategies on water use and profitability, specifically for deficit irrigation. Interest in this study has been high due to groundwater pumping restrictions, metering requirements, groundwater well moratoriums implemented in the four Natural Resource Districts in the Republican Basin, and the recently settled lawsuit between Colorado, Nebraska, and Kansas involving the Republican River Basin..



Steve Melvin, Extension Educator from the University of Nebraska discusses soil moisture holding capacities at Limited Irrigation Management Strategies Field Day held August 13, 2003 at site north of Holbrook, Nebraska

NKAO – Surge Valve Loaner Program -

- Reclamation works with the Natural Resources Conservation Service (NRCS), the local Natural Resource Districts, the University of Nebraska Extension Service, and various Irrigation Districts to educate and assist the irrigators with field setup, operation, and programming of surge valves. District irrigators can use a Reclamation provided surge valve free of charge for one year. At the end of the year the irrigator can purchase the valve from the District or return it to the District. The District uses these funds to purchase additional valves that will be used the next irrigation season.

NKAO – Canal Trash Screening Devices -

- NKAO provides financial and technical assistance to the Twin Platte NRD for the

demonstration of various canal trash screening devices. Irrigators in the Twin Platte NRD have been reluctant to install water meters or to utilize more efficient methods of irrigation (such as surge, gated pipe, and sprinkler) because they feel that surface water cannot be sufficiently screened. This project provides assistance for various types of canal screening devices used by other canal systems that will be displayed throughout the Twin Platte NRD.

NKAO – Water Measurement and Improved Delivery Service Demonstration – Pioneer Irrigation District

- Reclamation entered an agreement with the Pioneer Irrigation District (located in eastern Colorado and southwest Nebraska) to demonstrate various water measurement devices and improved farm delivery service installations. Reclamation's NKAO and Technical Service Center provide technical and financial assistance for various installations. Prior to the agreement the District estimated farm deliveries.



Flume installed on Pioneer Irrigation District farm turnout in southwest Nebraska as part of water measurement demonstration

NKAO and WYAO – Elbow Meter Technology -

- The NRCS, Reclamation's Water Resource Research Lab, the Wyoming Area Office, and the NKAO are working together on a research and demonstration project that will develop and demonstrate an inexpensive elbow meter that will be used to measure pipe flow in the Nebraska panhandle. The WRRL is completing the lab testing of these elbow meters and the field demonstration began in 2002. The NRCS will complete a report of

this demonstration following the 2004 irrigation season.



Field demonstration of inexpensive elbow meter at Mirage Flats Irrigation District

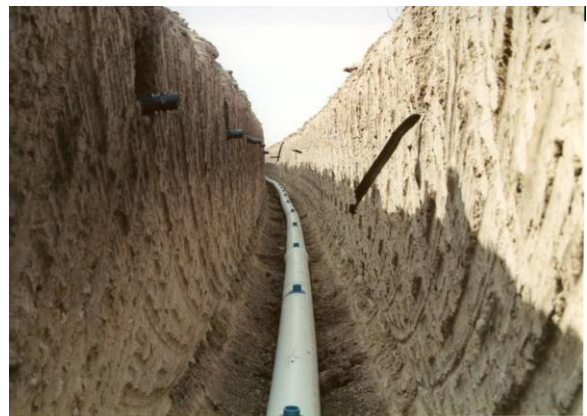
NKAO – Improved Irrigation Efficiency Demonstration Project – KSU -

- The NKAO provided financial assistance to Kansas State University (KSU) for an improved irrigation efficiency demonstration project in the Kansas Bostwick Irrigation District No. 2. The demonstration will compare water use efficiency between sub surface drip, sprinkler, and furrow irrigation systems. A linear move sprinkler was installed prior to the 2002 irrigation season and a sub-surface drip irrigation systems will be in operation for the 2004 irrigation season.



NKAO - Subsurface Drip Irrigation - University of Nebraska, West Central Research and Extension Center – North Platte -

- This project will demonstrate the potential for using subsurface drip irrigation (SDI) to improve water management and conserve the limited water supplies in southwest Nebraska. Information from this demonstration will be presented in technical papers, conferences and seminars, and field demonstration days. System installation will be completed in the spring of 2004.



Installation of subsurface drip irrigation system

WYAO - Subsurface Drip Irrigation - University of Nebraska, Panhandle Research and Extension Center -

- This project will demonstrate the potential for using subsurface drip irrigation (SDI) to improve water management and conserve surface water supplies in the North Platte River Valley. The project is investigating the impact on irrigation frequency for corn and bean yields using SDI. It will aid the public in developing knowledge on the installation, use, and maintenance of a SDI system in the local area, and provide irrigators an opportunity to observe the SDI in a field setting.

WYAO - Surge-Valve Demonstration Program - University of Nebraska, Panhandle Research and Extension Center -

- Through a cooperative agreement, Reclamation provided funds to the university for providing demonstrations to water user entities of surface-irrigation water conservation techniques, including surge irrigation water management. These demonstrations will help

water users identify conservation measures to include and implement in their water conservation plans.

OTAO –Weather Based Irrigation Scheduling -

- Reclamation provided financial assistance to help implement a weather station located at the Tom Green Water Control and Improvement District #1. The station is used to collect local weather data to calculate a daily evapo-transpiration at the District. The data from the weather station is integrated into Texas A&M's, Texas ET network and made available on the District's web page to assist farmers in efficiently scheduling their irrigations.



Weather station located at Tom Green WCID #1

OTAO – Sub Surface Drip Irrigation Demonstration -

- In 2003 Reclamation's OTAO provided financial assistance to help initiate a cooperative 3-year demonstration program with the Tom Green County Water Control and Improvement District #1 and a local district farmer show that sub-surface drip irrigation (SDI) technology is feasible utilizing treated effluent as a source of water. Partners in the effort include the Natural Resources Conservation Service, Tom Green County Soil and Water Conservation District, Texas State Soil and Water Conservation Board, Texas Cooperative Extension Service. Local irrigators have been slow to adopt micro-irrigation technology in the water district due to concerns about system plugging when using treated wastewater. This project will

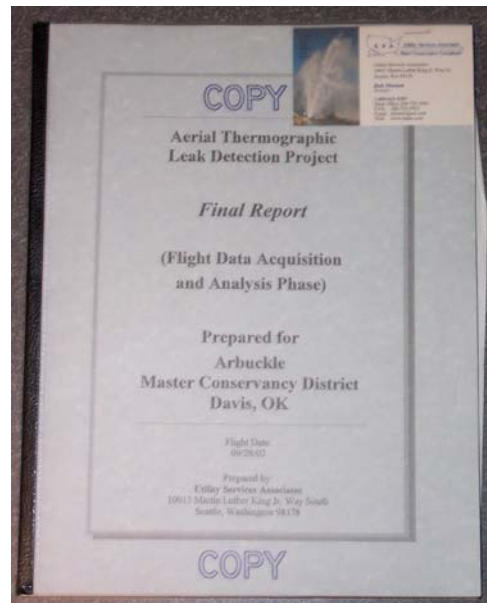
demonstrate design, operation & maintenance, and proper management of a state of the art, high efficiency, subsurface drip irrigation system. The design will incorporate water supply chemical treatment and filtration. This demonstration will help to encourage local farmers to adopt water more efficient irrigation technologies which save water and further stretch short water supplies in a competitive area.



Sub-surface drip irrigation demonstration

OTAO – Infrared Ariel Surveys and Leak Detection Equipment -

- Financial assistance was made available to the City of Corpus Christi, City of San Angelo, City of Wichita, Fort Cobb Master Conservancy District, Central Oklahoma Master Conservancy District, Mountain Park Master Conservancy District, Foss Reservoir



Arbuckle MCD aerial leak detection survey

Master Conservancy District, and Canadian River Municipal Water Authority to conduct aerial surveys and to assist with purchase of leak detection equipment.

—— Implementation of Conservation Measures ——

DKAO – Implementation of Measures -

- DKAO has cooperative agreements with 4 districts to cost-share the implementation of approved conservation measures on approximately 82,000 acres of irrigated farmland. The measures are: implementing water measurement and accounting systems; installing and rehabilitating water measurement structures; calibrating water control structures; purchasing flow measurement equipment; testing pumping plant efficiency and pump performance; replacing open laterals with pipelines; purchasing surge valves and gated pipe; converting from flood irrigation to sprinkler systems; converting sprinkler systems to drop nozzles and lower pressure; rebuilding pumps to provide optimum pressure and field uniformity; utilizing a spray-on canal sealant; providing training to district personnel on water measurement, water district operation and maintenance, and canal operation and automation.

DKAO – Canal Replacement Program -

- DKAO has provided technical and financial



Belle Fourche ID, Angostura Unit, SD - Replacing open lateral with buried pipeline

assistance to Belle Fourche and Angostura districts to assess and replace high loss, high maintenance sections of open ditch lateral with buried pipe. These projects reduce system water losses, improve water accounting and scheduling, and reduce seepage impacts to adjacent landowners

DKAO – Canal Structure Automation

- Technical and financial assistance was provided to the Belle Fourche Irrigation District to automate the Townsite Lateral gate. Automating this gate will reduce canal fluctuations, relieving problems for irrigators getting too much or too little water and reduce operational wastes.

DKAO – Belle Fourche Wasteway measurements

- DKAO is working with the Belle Fourche Irrigation District and Reclamation staff from the TSC to measure and demonstrate new cost effective wasteway measurement devices. The goal is to integrate these devices into a telemetry system to allow the district to reduce operational spills.

DKAO – Angostura Flow Measurement Replacement -

- DKAO provided technical and financial assistance to the Angostura Irrigation District to replace an antiquated flow measurement system with a state-of-the art transit-time clamp-on acoustic flowmeter to provide flow measurement accuracy of 1 percent of the actual flowrate. Reclamation staff from the Rapid City Field Office and the TSC coordinated the selection, purchase, and installation of a ultrasonic flowmeter. The district utilized cost-share funds from Reclamation to purchase the flowmeter. .



Angostura ID, flow measurement installation

DKAO - Bridging-the-Headgate Programs -

- DKAO entered into a "Bridging-the-Headgate" (B-T-H) cooperative agreement with Belle Fourche Irrigation District and Butte County Conservation District (working through the District Conservationist for the Natural Resources Conservation Service). Agreement is to input project and local utility facilities into a Geographical Information System database; provide technical assistance to the District and local irrigators, and to collect water quality data within the project.

ECAO - South Platte Watershed Forum – Northern Colorado Water Conservancy District and other entities in the South Platte Basin -

- An adult based educational opportunity for interested people. The forum focuses on issues in the South Platte Basin.

ECAO - Arkansas River Basin Watershed Forum -Southeastern Colorado Water Conservancy District -

- An adult based educational opportunity for interested people. The forum focuses on issues in the Arkansas Basin.

ECAO - Update and Integrate Irrigation Scheduling Program into Web Page - Northern Colorado Water Conservancy District -

- This project will increase irrigation efficiency, improve water quality through reduced run-off and deep percolation and assist farmers implementing Best Management Practices. By developing a

precise soil moisture reference standard for tensiometers; updating in field monitoring and reading of tensiometers; and writing software for farmer's accessibility to web-page to run irrigation scheduling program. The project will be completed in 2004.

ECAO - Best Management Practices (BMPs) within the Purgatorie River Water Conservancy District's Boundaries - Natural Resource Conservation Service (NRCS)/Spanish Peaks and Purgatorie Soil Conservation District -

- Through a cooperative agreement, water conservation and management are being developed and installed on individual farms throughout the PRWCD. Type of BMPs is land leveling, gated pipe, and surge valves. The program is administered through the local NRCS. In 1996 three farmers participated, the program has reached 55 of the 172 farmers within the district. The farmer provides 40% of cost for improvements.

ECAO - Cooperative Program of Water Resources Data Collection - Southeastern Colorado Water Conservancy District -

- This program is in cooperation with the USGS. The USGS monitors three water measurement sites along the Arkansas River. This information helps to manage the movement of water throughout the Fryingpan-Arkansas Project. This program is in its third year. Reclamation provides financial assistance to SE on a yearly basis depending on the request.

ECAO - Acreage Verification System (AVS) – PRWCD -

- Through a cooperative agreement with the PRWCD development and installation of an AVS database is occurring. The AVS will allow the PRWCD to manage the use of water in the district. The database will allow queries and reports to be produced. The database is to be completed by the end of the 2003 Fiscal Year.

NKAO – Buried Pipe Program -

- The NKAO has provided technical and financial assistance to various districts to for the replacement of high loss, high maintenance sections of open ditch lateral with buried pipe.

These projects reduce system water losses, improve water accounting and scheduling, and provide on-farm efficiency improvements. Irrigation Districts participating in this program in 2003 include Frenchman Cambridge, Bostwick in Nebraska, Almena, Kansas Bostwick, Kirwin, and Webster.

NKAO – Nebraska Soil Moisture Monitoring Program – High Plains Regional Climate Center

- The NKAO has provided financial assistance to the High Plains Regional Climate Center (HPRCC) for soil moisture monitoring equipment that will be added to the HPRCC's Automated Weather Data Network throughout Nebraska. This equipment will provide real time data that will assist in accessing soil water conditions, crop growth, irrigation scheduling, and monitoring drought conditions.

NKAO – Water Measurement Improvements -

- The NKAO has provided assistance to various districts to improve the accuracy of water measurement. This includes the construction of ramp flumes at the head of canals, providing equipment for remote monitoring, portable pipe flumes for new lateral measurement sites, and purchased ultrasonic meters that Districts can use to check existing propeller meters.



Broad crested weir constructed in spring of 2003 on Courtland Canal below Lovewell Dam in north-central Kansas

NKAO – Canal Automation – Mirage Flats Irrigation District -

- Technical and financial assistance was

provided to the Mirage Flats Irrigation District for canal automation. The District has currently has three automated canal sites, and numerous remote monitoring sites. Advances in automation equipment, along with increases in the number of manufacturers of this equipment, have lowered the costs of implementing these projects.

NKAO – Remote Monitoring Installations – State of Nebraska -

- NKAO has provided technical, financial, and installation assistance for the installation of remote monitoring equipment on existing and new stream gage sites along the Republican River and it's tributaries to assist the Nebraska Department of Natural Resources in administering surface water rights in the basin. Five sites were added prior to the 2003 irrigation season and additional sites are scheduled for installation prior to the 2004 irrigation season.

NKAO – Remote Monitoring Installations – Irrigation Districts -

- NKAO has provided technical, financial, and installation assistance for remote monitoring equipment on wasteways and other key canal



Remote monitoring site installed in the spring of 2003 on Bostwick Irrigation District in Nebraska's Franklin Canal west of Red Cloud, Nebraska

measurement sites to improve water management, accounting, and scheduling in the Almena Irrigation District in northwest Kansas, the Frenchman-Cambridge Irrigation District in southwest Nebraska, and the Bostwick Irrigation District in south-central

Nebraska.

WYAO - Tri-State Canal Ramp Flume - Farmers Irrigation District -

- Funds were provided for the construction and installation of a long-throated measurement structure at the Tri-State Canal operated by Farmers Irrigation District. The Tri-State Canal delivers water for irrigation to the Farmers and Northport Irrigation Districts. The Ramp Flume was completed prior to the 2003 irrigation season.



Tri-State Canal ramp flume

WYAO - Low Flow Check Structures Installation - Gering Fort-Laramie Irrigation District -

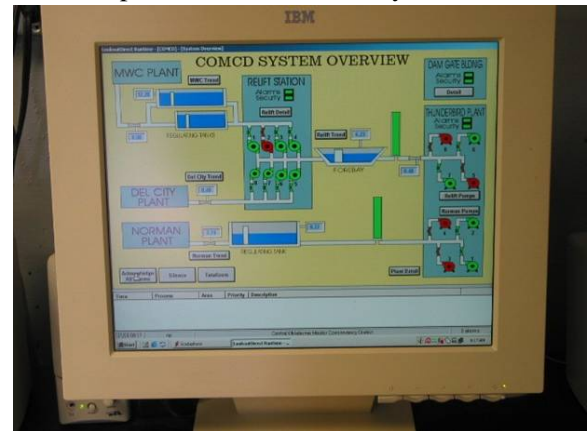
- Funds were provided for the construction of a check structure on the Fort-Laramie Canal. Completion of this project will allow the district to reduce early and late season diversions and conserve the limited water supply of the North Platte River system.

WYAO - Midvale Irrigation District-Laptop Computer with Link to the District's Water Accounting Software -

- Reclamation provided funding for the development of remote access capabilities via laptop computer to the District's existing water accounting software. The remote access capabilities are used by the ditchriders to adjust canal operations on a real time basis in an effort to improve the overall efficiency of the District's irrigation system.

OTAO - Flow Measurement and Accounting - SCADA -Central Oklahoma Master Conservancy District -

- Funds were provided on a 50/50 cost-share basis to update the District's telemetry system. District staff is providing all labor associated with installation of the flow meters and development of the SCADA system.



Central Oklahoma MCD telemetry system interface

OTAO - Flow Measurement and Accounting - SCADA - Arbuckle Master Conservancy District. -

- District completed \$48,900 in upgrades to telemetry system in September 2003. Upgrades include the implementation of a Human Machine Interface into the system as well as the ability to open and close the motor operated valves located at the Davis, Kerr-McGee and Wynnewood turnouts from the HMI SCADA Computer. Personnel are now also able to control the Raw Water Pumps manually via the SCADA computer or utilize configurable set-points allowing the operator to adjust pump starts and stops (including rotation) automatically based on the effluent reservoir level. The system will also monitor and display the existing points in the system, trend the lake and reservoir levels, alarm local personnel of system malfunction or unauthorized intrusion and allow for remote access via the provided Laptop computer.

OTAO – Computerized Water Accounting System

- Under a cooperative agreement in 2003, Reclamation assisted Tom Green WCID#1 with implementing a new computerized water accounting program. This program fully automates the water accounting process in the District office. Employees now use laptops in each of the ditch rider's vehicles to account for water deliveries.



Tom Green WCID #1 mobile telemetry system interface

- Reclamation also provided technical and financial assistance to develop a web site which is integrated with the District water account software to inform the waters users of their daily water usage/balances and water



The Tom Green WCID #1 web page allows farmers to view daily updated their account information and weather station data

ordering capability. The web site is updated with current data on a daily basis. The project is planned for a two year demonstration period to determine if the web page is useful to the District and local

irrigators.

OTAO - Flow Measurement and Water Accounting – SCADA

- In 2003, Foss Reservoir Master Conservancy District completed work on a new water treatment facility. Reclamation provided financial assistance for the purchase of 5 magnetic flow meters and for replacement of the districts outdated telemetry system. District provided cost-share and in-kind labor contributions.

MTAO-Greenfields Irrigation District -

- MTAO and Greenfields Irrigation District worked cooperatively on the installation of an additional stream gauge on the Sun River. The gauge will provide additional flow data needed to better manage the flows on the Sun Rive Project

MTAO – Canal Headworks Automation –

- Funds were provided to automate the headworks of Paradise Valley Canal. The activity was identified under an engineering assessment conducted with funds provided earlier in the year.

MTAO – Lateral Conversion -

- Technical and financial assistance was provided to Fort Shaw Irrigation District through a cooperative agreement to replace an open lateral with buried pipe. The conversion will improve the efficiency of Fort Shaw Irrigation District's distribution system.

Water Conservation Recognition

For FY2003, area program coordinators recognized several water user organizations that demonstrated leadership in advancing water use efficiency in the Great Plains Region.

The Tom Green Water Control and Improvement District #1, part of Reclamation's San Angelo Project in west-central Texas, was nominated to receive the Commissioner's Award for demonstrating that they are efficiently managing

water through creative means. The District has been progressive in modernizing its operations, including developing and effective water conservation plan, and implementing measures to increase the efficiency of its delivery system.

Great Plains Regional Director's awards were presented to:

- Southeastern Colorado Water Conservancy District in recognition of exceptional efforts towards demonstration of a Xeriscape garden in order to educate the public about the benefits of improving water efficiencies and management.
- Mr. Bart Krautschun and Dr. Hal Werner of South Dakota State University Extension Service in recognition of exceptional service and support of Reclamation Water Conservation programs on the Belle Fourche and Angostura projects.

Vision for the Great Plains Regional Water Conservation Program

VISION

In cooperation with water users, states, federal agencies, local entities and others, we in the Great Plains Region should direct our water management and conservation efforts towards helping water users identify and implement water efficiency improvements that will improve the overall beneficial uses of water and related resources.

Through proactive but judicious use of technical and financial assistance, technology transfer, and education programs, we will work in the interest of the public good by:

- Helping to remedy current problems by providing tools (education, training, outreach) to help resolve, and prevent, similar problems in the future,
- Find ways to provide water for beneficial uses which are presently not being met,
- Reducing negative impacts resulting from inefficient water operations, and
- Improving, enhancing or enlarging current benefits for present beneficiaries.

Through successful implementation of the WCFSP, we in the Great Plains Region will demonstrate to the water user community, the public, states, other partners, and staff, our capability and sincere commitment to managing and protecting the water and related resources to which we are entrusted in an environmentally and economically sound manner.